

PATENT APPLICATION NO.
 21 01 835038

S & F REF:

39755/vr

 LODGING DATE
 22 83.07.11

 FULL NAME(S) OF APPLICANT(S)
 71 DRAYCOTT TRADING & FINANCE S.A.

 FULL NAME(S) OF INVENTOR(S)
 72 JACOBUS FRÉDERIK DE BEER

EARLIEST PRIORITY CLAIMED	COUNTRY	NUMBER	DATE
33	ZA	31 82/4889	32 82.07.09

NOTE: The country must be indicated by its International Abbreviation - see schedule 4 of the Regulations.

 TITLE OF INVENTION
 54 FUEL COMPOSITION

I/We Lovat MacDonald

hereby declare that-

~~I/we are the applicant(s) named above~~

2. I/we have been authorised by the applicant(s) to make this declaration and have knowledge of the facts herein stated in the capacity of President of the applicant(s);

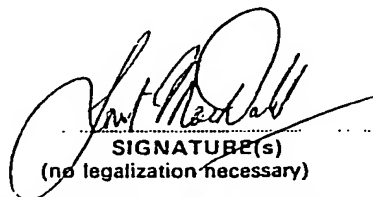
3. the inventor(s) of the abovementioned invention is/are the person(s) named above and the applicant(s) has/have acquired the right to apply by virtue of an assignment from the inventor(s);

4. to the best of my/our knowledge and belief, if a patent is granted on the application, there will be no lawful ground for the revocation of the patent;

5. this is a convention application and the earliest application from which priority is claimed as set out above is the first application in a convention country in respect of the invention claimed in any of the claims; and

6. the partners and qualified staff of the firm of SPOOR AND FISHER, patent attorneys, are authorised, jointly and severally, with powers of substitution and revocation, to represent the applicant(s) in this application and to be the address for service of the applicant(s) while the application is pending and after a patent has been granted on the application.

SIGNED AT London THIS 26th DAY OF January 19 83


 SIGNATURE(s)
 (no legalization necessary)

*In the case of applications in the name of a Company, Partnership or Firm, give full names of signatory/signatories, delete paragraph 1, and enter capacity of each signatory in paragraph 2

**If the applicant is a natural person, delete paragraph 2.

***If the right to apply is not by virtue of an assignment from the inventor(s), delete 'an assignment from the inventor(s)' and give details of acquisition of right.

****For non-convention applications delete paragraph 5.

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978
**APPLICATION FOR A PATENT
AND ACKNOWLEDGEMENT OF RECEIPT**
(Section 30 (1) - Regulation 22)

REVENUE STAMPS OR REVENUE FRANKING
MACHINE IMPRESSION

OFFICIAL DATE STAMP

The grant of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate

OFFICIAL APPLICATION No.

S & F REFERENCE

21	01	835038
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39755/sb

FULL NAME(S) OF APPLICANT(S)

71	DRAYCOTT TRADING & FINANCE S.A.
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ADDRESS(ES) OF APPLICANT(S)

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TITLE OF INVENTION

54	FUEL COMPOSITION
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PRIORITY IS CLAIMED AS SET OUT ON THE ACCOMPANYING FORM P.2.

THIS APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO.

21	01	
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THIS APPLICATION IS A FRESH APPLICATION IN TERMS OF SECTION 37 AND BASED ON APPLICATION NO.

21	01	
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THIS APPLICATION IS ACCOMPANIED BY:

- ☒ 1. ~~A single copy of a provisional or~~ two copies of a complete specification of11..... pages.
- ☐ 2. Drawings of sheets
- ☒ 3. Publication particulars and abstract (Form P.8. in duplicate)
- ☐ 4. A copy of Figure of the drawings (if any) for the abstract
- ☒ 5. Assignment of invention
- ☐ 6. Certified priority document(s) (State number)
- ☐ 7. Translation of the priority document(s)
- ☐ 8. An assignment of priority rights
- ☒ 9. A copy of the Form P.2. and the specification of S.A. Patent Application No.

21	01	82/4889
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- ☒ 10. A declaration and power of attorney on Form P.3.
- ☐ 11. Request for ante-dating on Form P.4.
- ☐ 12. Request for classification on Form P.9.
- ☐ 13.

74 ADDRESS FOR SERVICE: SPOOR AND FISHER, SANDTON, PRETORIA, DURBAN

Dated this 11 Day of July 1983

SPOOR AND FISHER

APPLICANTS' PATENT ATTORNEYS

RECEIVED

OFFICIAL DATE STAMP

REGISTRAR OF PATENTS

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978
COMPLETE SPECIFICATION
(Section 30(1) - Regulation 28)

OFFICIAL APPLICATION NO.

21	01	835038
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LODGING DATE

22	83.07.11
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INTERNATIONAL CLASSIFICATION

51	C10L
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FULL NAME(S) OF APPLICANT(S)

71	DRAYCOTT TRADING & FINANCE S.A.
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FULL NAME(S) OF INVENTOR(S)

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TITLE OF INVENTION

54	FUEL COMPOSITION
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This invention relates to additives for fuels.

Fuels for the internal combustion engine, notably petrol (gasolene), diesel fuel and aviation fuel are in considerable demand and natural sources of these are finite. With the ever increasing cost of oil and consequently such fuel, considerable effort has gone into ways of extending such fuels with cheaper additives. In particular, investigations have been carried out to establish whether it is possible to add water to fuels. To date, however, such research has met with limited success and the addition of a maximum of about 6% of water is all that has been achieved although the addition of even these relatively small amounts of water have been considered to be worthwhile.

The present invention resides in the discovery that it is possible to incorporate much larger quantities of water in, notably, diesel fuel while still retaining the essential characteristics of the original fuel. It has surprisingly been found, according to the present invention, that as much as 120 parts by volume of water can be incorporated into 100 parts by volume of diesel fuel by incorporating with the water a non-ionic emulsifying agent. By this means, it has been found possible to obtain a homogeneous liquid to which appropriate additive or additives are added to provide the necessary viscosity and flash point desired for the fuel.

Accordingly, the present invention provides a fuel which comprises from 25 - 120 parts by volume of water per 100 parts by volume of

diesel fuel, a non-ionic emulsifying agent and one or more additives to provide the desired viscosity and flash point for the fuel. Preferably, the water : diesel fuel volumetric ratios are 35 - 100 : 100.

As indicated, up to about 120 parts by volume of water, preferably distilled water, can be incorporated in the fuel (per 100 parts). In general, 25 to 120 parts by volume of water can be incorporated and excellent results can be obtained by using about equal quantities of water and diesel fuel.

It will be appreciated that the essential component of the composition is the non-ionic emulsifying agent. The principal types of material which can be used for this purpose are the non-ionic surfactants which are ethoxylated alkyl phenols, fatty acid esters, fatty acid amides and polyoxyalkylene block copolymers. Of these, particularly good results have been obtained using ethoxylated alkyl phenols and fatty acid amides.

The ethoxylated alkyl phenols which can be used in the present invention typically have the following general formula $RC_6H_4O(C_2H_4O)_xH$ where R is C_8 to C_{12} alkyl, especially nonyl, and x represents the number of ethylene oxide or glycol derived units, generally up to about 30 although the best results have been obtained with materials where x is from 4 to 8, especially about 5.

Preferred fatty acid amides which can be used in the present invention are the fatty acid dialkanolamides, especially the

diethanolamides. A preferred diethanolamide is that derived from coconut oil fatty acid in which C_{10} , C_{12} and C_{14} acids predominate.

It is, of course, possible to use a mixture of non-ionic surfactants and it has been found that a mixture of ethoxylated alkyl phenol and fatty acid amide is particularly useful. In general, in this mixture the amount of the amide exceeds that of the ethoxylated alkyl phenol although this is not essential. Typically, using a mixture of the preferred nonyl phenol ethoxylate and the coconut fatty acid diethanolamide one uses 15 to 125 parts, especially 20 to 85 parts of the phenol per 100 parts of the amide (by volume).

The compositions of the present invention require one or more additives to provide the final fuel with the correct viscosity and flash point. Thus, in general, a diesel fuel should have a kinematic viscosity from 1.5 to 26.4 centistokes at 100°F although it will be appreciated that the precise value depends on the desired end use of the fuel. Thus when the fuel is to be used in engines subjected to variable loads and speed the kinematic viscosity is generally from 1.5 to 2.5, when it is to be used for engines subjected to heavy load with uniform speed from 2.0 to 5.0 and for engines used at low speed but a uniform speed a value from 5.8 to 26.4 centistokes.

The flash point of the fuel should in general be at least 38°C and in general from 38 to 60°C .

Suitable materials for adjusting the viscosity of the fuel include heavy naphtha, naphtha solvent, naphtha liquid, Sarasol (a mixture of isomers of diethylbenzene and butyl benzene), benzol, methyl formate, kerosene (paraffin), light creosote oil, tertiary butyl alcohol and fuel oil. Suitable additives for adjusting the flash point include thin transformer oil as well as other technical and cosmetic oils. Kerosene can in fact be used for both purposes. In other words, by using kerosene, in particular that used for lighting paraffin lamps, one is able to satisfy both the viscosity and the flash point requirements.

Naturally, the amounts of these additives will depend on their own viscosities and flash points but, of course, the appropriate amounts can readily be ascertained by experiment. If kerosene is employed to fulfil both functions it is generally used in an amount from 30 to 50, especially 35 to 50, parts by volume per 100 parts by volume of the water.

Likewise, it will be appreciated that the precise quantity of emulsifying agent employed will vary but, in general, 5 to 40; preferably 10 to 30 and especially 10 to 20 parts by volume of emulsifying agent are employed per 100 parts by volume of water.

In order to manufacture the fuels of the present invention it is generally most convenient to add the water and non-ionic emulsifying agent to the diesel fuel and to agitate the mixture until it clears to produce a homogeneous clear solution. The additive or additives are then added while continuing agitation to provide the correct viscosity and flash point.

It has been found that the amount of emulsifying agent employed affects the time it takes to produce a homogeneous solution. In some instances several weeks are required but, in fact, it is usually the case that the bulk of the mixture forms a homogeneous solution in a few days and this can be drawn off and the remaining, say, 20% used for a fresh preparation. In general, by increasing the amount of emulsifying agent employed one reduces the "maturing period". In this connection, it should be appreciated that there is not a strict linear relationship between the amounts of emulsifying agent, amounts of water added and of the other components. It should also be appreciated that once the water has been added to the fuel it is in fact possible to add the other ingredients in any order although, of course, mixing is essential.

It will be appreciated that the present invention has been described with particular reference to diesel fuel but it should be noted that the invention is also applicable to other fuels, notably petrol and aviation fuel. With regard to the latter, however, it has generally been found to be more convenient to prepare the special diesel fuel of the present invention and then to mix this with the petrol or aviation fuel. In general, it has been found possible to add up to about 1 part by volume of the formulated diesel fuel to 1 part by volume of petrol or aviation fuel.

Example 1

200 parts diesel oil and 200 parts water are mixed. 35 parts coconut oil fatty acid diethanolamide (liquid form) are then added to the mixture which is then stirred vigorously. At first,

the mixture becomes milky-white and thick; continued stirring gives a homogeneous mixture. 5 parts ethoxylated nonylphenol polyether glycolate N4 are added to the mixture, with stirring, until it goes clear (residual cloudiness can be removed by adding a small additional amount of the diethanolamide).

1 g. phenol crystals per l. of the mixture is added with stirring, followed by 7.5 parts n-hexane (a petroleum fraction boiling at 67-70°C). 16 parts ammonium nitrate are then added.

The flash-point and viscosity of the product can be adjusted by increasing the amount of hexane. The "Citane" value and flash-point can be adjusted by varying, for example reducing, the amount of ammonium nitrate.

Example 2

200 parts diesel oil and 200 parts water are mixed. 15-18% coconut oil fatty acid diethanolamine are added to the mixture, with stirring, until that clears. 7.5 parts of the same n-hexane fraction as used in Example 1 are then added to adjust the viscosity to a suitable value, followed by phenol crystals in the same amount as used in Example 1.

Examples 3 and 4

Two compositions of the invention are prepared from:

	<u>Example 3</u>	<u>Example 4</u>
Diesel Oil	1000 parts	1000 parts
Water	1000 parts	1000 parts
Coconut Diethanolamide (CDE)	120 parts	

	<u>Example 3</u>	<u>Example 4</u>
Nonylphenol Ethoxylate N5	25 parts	25 parts
Illuminating Paraffin (Kerosene)	400 parts	400 parts

The composition of Example 3 "matures" almost immediately on mixing the ingredients. Both compositions are inexpensive.

Example 5

A composition of the invention is prepared from:

Diesel Fuel	58.6%
Water	24%
Coconut Diethanolamide (CDE)	13.7%
Nonylphenol Ethoxylate N4	2.4%
Phenol	1.2%

This composition can show good results when run in a diesel engine, i.e. a net gain of the order of 10% in consideration of increased efficiency minus increased consumption.

CLAIMS

1. A fuel which comprises from 25-120 parts by volume of water per 100 parts by volume of diesel fuel, non-ionic emulsifying agent and one or more additives to provide the desired viscosity and flash point for the fuel.
2. A fuel according to claim 1 which comprises 35 to 100 parts by volume of water per 100 parts by volume of diesel fuel.
3. A fuel according to claim 1 or 2 in which the emulsifying agent is an ethoxylated alkyl phenol or a fatty acid amide or a mixture thereof.
4. A fuel according to claim 3 in which the ethoxylated alkyl phenol has the formula: $RC_6H_4O(C_2H_4O)_xH$ where R is C_8 to C_{12} alkyl and x represents a number up to 30.
5. A fuel according to claim 4 in which R is nonyl and x is from 4 to 8.
6. A fuel according to claim 3 in which the fatty acid amide is coconut oil fatty acid diethanolamide.
7. A fuel according to claim 3 in which the emulsifying agent comprises 15 to 125 parts by volume of nonyl phenol ethoxylate per 100 parts by volume of coconut oil fatty acid diethanolamide.

8. A fuel according to any one of the preceding claims in which the desired viscosity and flash point are obtained using kerosene.

9. A fuel according to any one of the preceding claims in which the emulsifying agent is present in an amount from 5 to 40 parts by volume per 100 parts by volume of water.

10. A fuel according to claim 9 in which the emulsifying agent is present in an amount from 10 to 20 parts by volume per 100 parts by volume of water.

11. A fuel according to claim 1 substantially as hereinbefore described.

12. A method of preparing a fuel as claimed in any one of the preceding claims which comprises adding the water to the diesel fuel and adding the emulsifying agent and agitating the mixture until at least a part is homogeneous and removing the homogeneous mixture.

13. A fuel whenever prepared by a method as claimed in claim 12.

14. A modified petrol or aviation fuel which comprises a mixture of petrol or aviation fuel and a fuel as claimed in any one of claims 1 to 11 and 13.

15. A fuel substantially as described in this specification with reference to the illustrated examples.

DATED THIS 11th DAY OF JULY 1983

SPOOR AND FISHER
PATENT ATTORNEYS FOR THE APPLICANT